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(54) Title: ABSORBENT ARTICLE WRAPPER COMPRISING A SIDE FLAP FASTENER COVER			
(57) Abstract			
<p>The absorbent article extends in a longitudinal direction and comprises a main body portion (22) having a pair of longitudinal side edges, a pair of end edges, a garment surface, and a body surface. The absorbent article comprises a pair of flaps (24) joined to the main body portion and extending laterally outward beyond the longitudinal side edges of the main body portion. The garment surface of each of the flaps comprises a flap fastener (76) and the flaps are folded over the body surface of the main body portion to expose the flap fastener. A wrapper (78) for the absorbent article comprises a main wrapper sheet (80) and a flap fastener cover (81). The flap fastener cover comprises a pair of longitudinal side portions, a pair of end portions, a releasable surface facing the flap fastener of the flaps, an opposing surface, a first portion, and a second portion. A majority of the first portion extends in the first region, and the flap fastener cover is releasably affixed to the flap fasteners of the flaps. The main wrapper sheet and the main body portion of the absorbent article are folded as a unit about the second axis so that the majority of the flaps superposes with the body surface side of the main body portion in the third region with interposing the first portion of the flap fastener cover therebetween. At least a part of the second portion of the flap fastener cover is joined to the outer surface of the main wrapper sheet.</p>			

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ABSORBENT ARTICLE WRAPPER COMPRISING
A SIDE FLAP FASTENER COVER

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FIELD OF INVENTION

10 This invention relates to an absorbent article individually packaged by a wrapper comprising a main wrapper sheet for the absorbent article and a flap fastener cover for flap fasteners of flaps.

BACKGROUND

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An absorbent article such as a sanitary napkin comprising a pair of flaps which extend laterally outward from an absorbent means is well known. One type of such an absorbent article comprises a pair of flaps which extend laterally outward from a central region of both longitudinal side edges of an absorbent means. The flaps are intended to be folded around the edges of a wearer's undergarment in the crotch region. Thus, in use the flaps are disposed between the edges of the wearer's undergarment in the crotch region and the wearer's thighs. Commonly, the flaps are provided with flap fasteners such as adhesive for affixing the flaps to the underside of the wearer's undergarment. The flaps serve at least two purposes. First, the flaps prevent exudates which otherwise would soil the edges of the wearer's undergarment from doing such. Second, the flaps help stabilize the napkin from shifting out of the position chosen by the wearer. This is especially so when the flaps are affixed to the underside of the undergarment.

The flaps of such sanitary napkins may be folded onto the topsheet side or the backsheet side to conserve space during packaging, i.e., the period between manufacture of the sanitary napkin and its intended first use by the wearer. At the time of the first use by the wearer, the flaps are usually unfolded to facilitate installation of the sanitary napkin into the wearer's undergarment. The flap fasteners of the folded flaps are usually covered by a flap fastener cover so as not to inadvertently adhere to each other or another part of the product before the sanitary napkin is used. When the flaps are folded onto the topsheet side, the flap fasteners of the flaps face outside and are covered by the flap fastener cover thereby bridging the flaps to each other over the topsheet. Japanese Laid-

open Patent publication H5-293139 published on November 9, 1993, Japanese Laid-open Patent publication H6-78953 published on March 22, 1994 and Japanese Laid-open Utility-Model publication H6-26835 published on April 12, 1994 disclose sanitary napkins having flaps which are folded onto the topsheet and flap fasteners which are covered by a flap fastener cover. The sanitary napkins disclosed therein further comprise a main fastener for securing the sanitary napkin to the inside of the wearer's undergarment. The main fastener is also covered by a main fastener cover. Therefore, when the sanitary napkin is used, the wearer must remove both the flap fastener cover and the main fastener cover. The wearer must then properly dispose of the various fastener covers to prevent them from becoming litter.

Attempts to facilitate removal of a flap fastener cover and a main fastener cover from the sanitary napkin have been made. Japanese Laid-open Utility-Model publication H5-9526 published on February 9, 1993 and Japanese Laid-open Utility-Model publication H5-9529 published on February 9, 1993 disclose sanitary napkins comprising a sanitary napkin main body with a main body fastener, flaps with flap fasteners and a fastener cover for covering the flap fasteners and the main fastener. The fastener cover comprises flap fastener cover portions and a main fastener cover portion which are connected to each other. Therefore, as the main fastener cover portions are removed from the sanitary napkin main body, the flap fastener cover portion is also removed from the flaps.

Other attempts to facilitate removal of a flap fastener cover and/or a main fastener cover from a sanitary napkin main body have been made in connection with removal of a wrapper for individually packaging the sanitary napkin. Japanese Laid-open Utility-Model publication H6-26833 published on April 12, 1994 discloses a sanitary napkin comprising a sanitary napkin main body with a main fastener, flaps with flap fasteners, a wrapper for packaging the sanitary napkin main body, a flap fastener cover and a main fastener cover. The main fastener cover is connected to a part of the wrapper so that the main fastener cover is removed from the main body as the sanitary napkin main body is taken out from the wrapper. However, the flap fastener cover also must be removed from the flaps.

Japanese Laid-open Utility-Model H7-39820 published on July 18, 1995 discloses a sanitary napkin comprising a sanitary napkin main body having a topsheet, a backsheets, and an absorbent core. The sanitary napkin also comprises a pair of flaps which are folded around the edges of a wearer's undergarment in the crotch region when the sanitary napkin is used. Adhesive layers provided with the main body and the flaps are covered by an adhesive layer cover which may comprise a wrapper for individually packaging the

sanitary napkin. The flaps are folded to the inside of the main body. The adhesive layer cover covering the adhesive layers of the main body extends beyond the longitudinal sides and transverse edges of the main body. The adhesive layer cover extends beyond one transverse end and the extending portion of the adhesive layer cover is folded toward the inside to cover the adhesive layers of the flaps. Japanese Laid-open Utility-Model H6-75446 published on July 18, 1995 discloses a sanitary napkin comprising a sanitary napkin main body and a pair of flaps extending laterally outward from the both sides in the longitudinal direction of the sanitary napkin. The flaps are folded onto a body facing side of the sanitary napkin before the sanitary napkin is used, and are folded around the edges of a wearer's undergarment in the crotch region when the sanitary napkin is used. A garment facing side of the sanitary napkin provided with an adhesive layer is wrapped by a wrapper releasably treated. The wrapped sanitary napkin is folded together with the wrapper about a folding line. This publication further discloses a packaging structure for the sanitary napkin where a part of the wrapper covers the adhesive layers of the flaps. Namely, the transverse edge of the wrapper extends beyond the end edge of the sanitary napkin and is folded towards the adhesive layers of the flaps which are folded onto the topsheet. European Patent publication EP 0 750 896 A2 published on January 2, 1997 discloses a sanitary napkin comprising a napkin body and a pair of flaps extending from transversely opposite side edges of the napkin body. The napkin body is folded longitudinally thereof in a three layer overlapping relationship and the flaps are also folded onto a top surface of the napkin body. Release sheets are releasably bonded onto adhesive zones provided on back surfaces of the napkin body and the flaps, respectively. A wrapping sheet is also folded together with the napkin body so as to wrap the napkin body as well as the flaps, wherein the respective release sheets are fixedly bonded to an inner surface of the wrapping sheet so that the wrapping sheet and the release sheet can be peeled off in the form of an integrated strip-like sheet from the napkin when picking out the napkin from the wrapping sheet.

While prior art absorbent articles such as sanitary napkins have addressed some of the problems of achieving an individually packaged absorbent article, they have not addressed the problems to the extent of or in the manner of the present invention. Therefore, a primary object of the present invention is to provide an improved individually packaged absorbent article.

SUMMARY

The present invention provides an individually packaged absorbent article. In one aspect of the present invention, an absorbent article extends in a longitudinal direction and comprises a main body portion having a pair of longitudinal side edges, a pair of end edges, a garment surface, and a body surface. The garment surface of the main body portion may be placed in a wearer's undergarment. The absorbent article comprises a pair of flaps joined to the main body portion and extending laterally outward beyond the longitudinal side edges of the main body portion. The garment surface of each of the flaps comprises a flap fastener. The flaps are folded over the body surface of the main body portion to expose the flap fastener. A wrapper for the absorbent article comprises a main wrapper sheet and a flap fastener cover. The main wrapper sheet comprises a pair of longitudinal side portions, a pair of end portions, an inner surface facing the main body portion and an outer surface. The main wrapper sheet is positioned adjacent to the garment surface of the main body portion. The main wrapper sheet and the main body portion of the absorbent article comprise two transverse axes and three regions divided by the two axes. The three regions comprise a first region into which a majority of the flaps extends, a second region and a third region which position on both longitudinal sides of the first region. The two transverse axes comprise the first axis extending laterally between the first region and the second region and the second axis extending laterally between the first region and the third region. The flap fastener cover comprises a pair of longitudinal side portions, a pair of end portions, a releasable surface facing the flap fastener of the flaps, an opposing surface, a first portion, and a second portion. A majority of the first portion extends in the first region. The flap fastener cover is releasably affixed to the flap fasteners of the flaps. The main wrapper sheet and the main body portion of the absorbent article are folded as a unit about the second axis so that the majority of the flaps superposes with the body surface side of the main body portion in the third region with interposing the first portion of the flap fastener cover therebetween. The main wrapper sheet and the main body portion of the absorbent article are folded as a unit about the first axis so that the body surface side of the main body portion in the second region superposes with the outer surface side of the main wrapper sheet with interposing the second portion of the flap fastener cover therebetween. At least a part of the second portion of the flap fastener cover is joined to the outer surface of the main wrapper sheet.

In another aspect of the present invention, an absorbent article extends in a longitudinal direction and comprises a main body portion having a pair of longitudinal side edges, a pair of end edges, a garment surface provided with a main fastener, and a body surface. The garment surface of the main body portion may be placed in a wearer's

undergarment. The absorbent article comprises a pair of flaps joined to the main body portion and extending laterally outward beyond the longitudinal side edges of the main body portion. The garment surface of each of the flaps comprises a flap fastener. The flaps are folded over the body surface of the main body portion to expose the flap fastener. A wrapper for the absorbent article comprises a main wrapper sheet, a main fastener cover and a flap fastener cover. The main wrapper sheet comprises a pair of longitudinal side portions, a pair of end portions, an inner surface and an outer surface. The main fastener cover comprises a pair of longitudinal side portions, a pair of end portions, an inner surface and an outer surface. The inner surface covers the main fastener of the main body portion and at least a part of the outer surface is connected to the inner surface of the main wrapper sheet. The main wrapper sheet and the main body portion of the absorbent article comprise two transverse axes and three regions divided by the two axes. The three regions comprise a first region into which a majority of the flaps extends, a second region and a third region which position on both longitudinal sides of the first region. The two transverse axes comprise the first axis extending laterally between the first region and the second region and the second axis extending laterally between the first region and the third region. The flap fastener cover comprises a pair of longitudinal side portions, a pair of end portions, a releasable surface facing the flap fastener of the flaps, an opposing surface, a first portion, and a second portion. A majority of the first portion extends in the first region. The flap fastener cover is releasably affixed to the flap fasteners of the flaps. The main wrapper sheet and the main body portion of the absorbent article are folded as a unit about the second axis so that the majority of the flaps superposes with the body surface side of the main body portion in the third region with interposing the first portion of the flap fastener cover therebetween. The main wrapper sheet and the main body portion of the absorbent article are folded as a unit about the first axis so that the body surface side of the main body portion in the second region superposes with the garment surface side of the main body portion in the third region with interposing the second portion of the flap fastener cover therebetween. At least a part of the second portion of the flap fastener cover is joined to the main fastener cover.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of a preferred embodiment of the wrapper of the present invention in an opened position with a preferred sanitary napkin disposed thereon and the flaps of the sanitary napkin outstretched.

FIG. 2 is a top plan view of the wrapper of the present invention shown in FIG. 1 with the flaps of the sanitary napkin folded over the topsheet.

FIG. 3 is a cross-sectional view of FIG. 2 taken along the line III-III.

5 FIG. 4 is a top plan view of the wrapper of the present invention shown in FIG. 1 before the flap fastener cover and the main wrapper sheet are joined.

FIG. 5 is a cross-sectional view of an alternate embodiment of the flaps of the sanitary napkin folded over the topsheet.

FIG. 6 is a cross-sectional view of FIG. 2 taken along the line VI-VI.

10 FIG. 7 is a perspective view of one preferred wrapper of the present invention.

FIG. 8 is a cross-sectional view (taken along the longitudinal centerline) of one preferred wrapper of the present invention with a sanitary napkin therein in a folded configuration.

FIG. 9 is a perspective view of one preferred individually packaged absorbent article of the present invention.

15 FIG. 10 is a top plan view of an alternative embodiment wrapper of the present invention with a sanitary napkin placed thereon in substantially the same configuration as FIG. 2.

FIG. 11 is a first cross-sectional view (taken along the longitudinal centerline) of the present invention explaining an action of removing a wrapper from a sanitary napkin.

20 FIG. 12 is a second cross-sectional view (taken along the longitudinal centerline) of the present invention explaining an action of removing a wrapper from a sanitary napkin.

FIG. 13 is a top plan view of another embodiment of the present invention with the flaps of the sanitary napkin folded over the topsheet.

25 FIG. 14 is a cross-sectional view of FIG. 13 taken along the line XIV-XIV.

FIG. 15 is a perspective view of the wrapper shown in FIG. 13.

FIG. 16 is a cross-sectional view (taken along the longitudinal centerline) of the wrapper shown in FIG. 13 with a sanitary napkin therein in a folded configuration.

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DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings, the present invention is embodied in a preferred but non-limiting embodiment. As shown in FIGS. 1, 2, and 3, the invention comprises a wrapper 78 for a disposable absorbent article, particularly a sanitary napkin 20.

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The sanitary napkin 20 is used to collect vaginal discharges, such as menses, and prevent soiling of the wearer's clothing by such discharges. As shown in FIGS. 1 and 2,

the sanitary napkin 20 basically comprises a main body portion 22 and flaps 24. The main body portion 22 of the sanitary napkin 20 may have a fastener, such as a pressure sensitive adhesive fastener 74 thereon for fastening the main body portion 22 in the wearer's undergarment. The flaps 24 preferably each have fasteners (flap fasteners) thereon, such as a pressure sensitive adhesive fastener 76, for releasably affixing the flaps 24 of the sanitary napkin 20 in a configuration folded around the edges of the crotch of the wearer's undergarment. The wrapper 78 of the present invention serves to cover and protect the flap fasteners 76 and the main body fastener 74 (if there is one), and is folded around the sanitary napkin 20 to provide an individual package for the sanitary napkin 20.

5 Before looking at the characteristics of the wrapper 78 in greater detail, the properties of the sanitary napkin 20 will be briefly discussed.

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The sanitary napkin 20 (and the main body portion 22 thereof) has two surfaces, a liquid pervious body-contacting surface or "body surface" 20A that is intended to be worn adjacent to the body of the wearer, and a liquid impervious garment surface 20B. The sanitary napkin 20 is shown in FIG. 1 as viewed from its body surface 20A. The sanitary napkin 20 has two centerlines, a principal longitudinal centerline L and a principal transverse centerline (not shown in FIG. 1). The term "longitudinal," as used herein, refers to a line, axis or direction in the plane of the sanitary napkin 20 that is generally aligned with (e.g. approximately parallel to) a vertical plane which bisects a standing wearer into left and right body halves when the sanitary napkin 20 is worn. The terms "transverse," "lateral" or "width" used herein, are interchangeable, and refer to a line, axis or direction which lies within the plane of the sanitary napkin 20 that is generally perpendicular to the longitudinal direction.

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FIG. 1 shows that the main body portion 22 of the sanitary napkin 20 comprises the portion of the sanitary napkin without the flaps 24. The main body portion 22 has two spaced apart longitudinal edges 26, two spaced apart transverse or end edges (or "ends") 28, which together form the periphery 30 of the main body portion. The main body portion 22 also has three sections comprising a central section (first section) 36, one end section (second section) 34 and the other end section (third section) 32. The first section 36 is disposed between the second section 34 and the third section 32. The second section 34 and the third section 32 extend outwardly in the longitudinal direction from the edges of the central section 36 of the main body portion 22. When the sanitary napkin 20 is individually packaged, the main body portion 22 and the wrapper 78 are folded into three regions comprising a first region 39, a second region 41, and a third region 43 divided by two fold axes F1 and F2 (refer to FIG. 2). The first section 36, the second

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section 34 and the third section 32 of the main body portion 22 generally extend in the first region 39, the second region 41 and the third region 43, respectively.

5 The main body portion 22 of the sanitary napkin 20 can be of any thickness, including relatively thick, intermediate thickness, relatively thin, or even very thin (or "ultra thin"). An "ultra-thin" sanitary napkin 20 as described in U.S. Patents 4,950,264 and 5,009,653 issued to Osborn preferably has a caliper of less than about 3 millimeters. The embodiment of the sanitary napkin 20 shown in the drawings is intended to be an example of a sanitary napkin of an intermediate thickness. The main body portion 22 of the sanitary napkin 20 may also be relatively flexible, so that it is comfortable for the 10 wearer. It should be understood that the sanitary napkin shown is merely one embodiment, and that the wrapper of the present invention is not limited to use with absorbent articles of the type or having the specific configurations shown in the drawings.

15 FIG. 3 shows the individual components of the main body portion 22 of the sanitary napkin 20. The main body portion 22 of the sanitary napkin 20 preferably comprises at least three primary components. These include a liquid pervious topsheet 38, a liquid impervious backsheet 40, and an absorbent core 42 positioned between the topsheet 38 and the backsheet 40. The topsheet, the backsheet, and the absorbent core may be assembled in a variety of configurations known in the art (including layered or "sandwich" configurations and wrapped or "tube" configurations).

20 Suitable materials for the components of the main body portion 22, and some of the various configurations in which such components can be assembled are described generally in U.S. Patent 4,321,924, entitled "Bordered Disposable Absorbent Article" issued to Ahr on March 30, 1982; U.S. Patent 4,425,130, entitled "Compound Sanitary Napkin" issued to DesMarais on January 10, 1984; U.S. Patent 4,950,264, entitled "Thin, 25 Flexible Sanitary Napkin" issued to Osborn on August 21, 1990; U.S. Patent 5,308,346, entitled "Elasticized Sanitary Napkin" issued to Sneller, et al. on May 3, 1994; and U.S. Patent 5,389,094, entitled "Absorbent Article Having Flaps and Zones of Differential Extensibility" issued to Lavash, et al. on February 14, 1995. The main body portion 22 of the sanitary napkin 20 may also be comprised of one or more extensible components such as those sanitary napkins, and the like described in U.S. Patent Application Serial Nos. 30 07/915,133 and 07/915,284, both filed July 23, 1992, in the name of Osborn, et al. (PCT Publication Nos. WO 93/01785 and 93/01786, both published February 4, 1993).

35 FIGS. 1 - 3 show a preferred embodiment of the sanitary napkin 20 assembled in a sandwich construction in which the topsheet 38 and the backsheet 40 have length and width dimensions generally larger than those of the absorbent core 42. The topsheet 38 and the backsheet 40 extend beyond the edges of the absorbent core 42 to form portions

of the periphery 30. The topsheet 38 is preferably joined to the body-facing side of the absorbent core 42 and the backsheet 40 is preferably joined to the garment-facing side of the absorbent core 42. The topsheet 38 and backsheet 40 can be joined to the absorbent core 42 in any suitable manner known in the art for this purpose, such as by an open 5 pattern of adhesives. The portions of the topsheet 38 and backsheet 40 that extend beyond the edges of the absorbent core 42 are preferably also joined to each other. These portions of the topsheet 38 and backsheet 40 can also be joined in any suitable manner known in the art. Preferably, in the embodiment shown, these portions of the topsheet 38 and backsheet 40 are joined using adhesives over substantially the entire portions that 10 extend beyond the edges of the absorbent core 42, and a crimp seal around the periphery 30 of the main body portion 22 where the topsheet 38 and backsheet 40 are densified by the application of pressure or heat and pressure.

The sanitary napkin 20 shown in FIGS. 1 - 3, as discussed above, also comprises a pair of flaps 24 that are joined to the main body portion 22. The flaps 24 extend laterally 15 outward beyond the longitudinal side edges 26 of the main body portion 22 from their proximal edges 44 to their distal edges (or "free ends") 46. The flaps 24 extend laterally outward from at least a part of the first section 36 of the main body portion 22 and majority of the flaps 24 extends in the first region 39 divided by the fold axes F1 and F2.

The flaps 24 can be joined to the main body portion 22 in any suitable manner. 20 The term "joined", as used herein, encompasses configurations in which an element is directly secured to another element by affixing the element directly to the other element; configurations in which the element is indirectly secured to the other element by affixing the element to intermediate member(s) which in turn are affixed to the other element; and configurations in which one element is integral with another element, i.e., one element is 25 essentially part of the other element. Preferably, in the embodiment shown in FIGS. 1 - 3, the flaps 24 are integral with the main body portion 22 (that is, the flaps 24 comprise integral extensions of the backsheet 40. Alternatively, the flaps 24 may comprise integral extensions of the topsheet 38 and the backsheet 40.).

In other alternative embodiments, the flaps 24 can comprise one or more separate 30 components that are joined to the garment-facing side of the main body portion 22. Preferably, in such a case, the flaps 24 comprise a separate component that is joined to the garment-facing side of the main body portion 22. In such alternative embodiments, the flaps 24 are preferably otherwise unattached to the garment-facing side of the main body portion 22 of the sanitary napkin 20 between the points where they are attached to the 35 main body portion 22 and the longitudinal side edges 26 of the main body portion 22. The flaps 24 in these latter embodiments can be joined to the garment-facing side of the

main body portion 22 by any suitable attachment mechanism. Suitable attachment mechanisms include, but are not limited to adhesives, and the like. The flaps 24 may be joined to the main body portion 22 by different attachment method from each other.

5 The places or regions on the sanitary napkin 20 where the flaps 24 are joined to (or extend from) the main body portion 22, are referred to herein as "junctures". These regions will typically be longitudinally-oriented (or "longitudinal") junctures, such as lines of juncture 48. These regions can be any of various curved or straight lines, but they are not limited to lines. Thus, the junctures can comprise flanges, strips, intermittent lines, and the like.

10 The flaps 24 may be of any configuration desired, with one preferred configuration being shown in FIG. 1. FIG. 1 shows that the flaps 24 are provided with zones of extensibility (or "zones of differential extensibility") 56 in the front edge and the back edge of each flap 24. The zones of extensibility 56 relieve stresses which are created in the flaps 24 by the folding of the flaps 24 around the crotch of the wearer's 15 undergarment. The zones of extensibility 56 thereby help eliminate bunching of the flaps 24 caused by said stresses. Preferably, in the embodiment shown in FIG. 1, the zones of extensibility 56 comprise pre-corrugated or "ring rolled" regions of the flaps 24 in which the corrugations 58 define ridges and valleys that are oriented at an angle to the principal longitudinal centerline L. Suitable structures for providing the flaps 24 with zones of 20 extensibility 56 are described in greater detail in U.S. Patent 5,389,094 issued to Lavash, et al. and in commonly assigned copending U.S. Patent Application Serial No. 08/380,769, entitled "Absorbent Article Having Flaps With Gathered Portions" filed in the name of Sue A. Mills, et al. on January 30, 1995.

25 The sanitary napkin 20 preferably also has fasteners for securing the sanitary napkin 20 in place in a wearer's undergarment. FIGS. 1 and 2 show a preferred arrangement of fasteners which comprises a main body portion (or central pad) fastener, such as central pad adhesive 74, and flap fasteners, such as flap adhesives 76. The fasteners used with the sanitary napkin 20 are not limited to adhesive fasteners. Any suitable type of fastener known in the art can be used for this purpose. For example, the 30 sanitary napkin 20 could be secured in place in a wearer's undergarment by mechanical fasteners, such as VELCRO®, or by a combination of adhesive and mechanical fasteners. For simplicity, however, the fasteners will be described in terms of adhesive fasteners and these fasteners are preferably pressure sensitive adhesive fasteners. Suitable pressure sensitive adhesive fasteners are described in greater detail in U.S. Patent 4,917,697.

35 The central pad adhesive 74 and the flap adhesives 76 can be provided in any suitable configuration. In the preferred embodiment shown, the central pad adhesive 74

is provided in the form of a longitudinally oriented strip of adhesive that is centered about the principal longitudinal centerline L. The flap adhesives 76 are provided in the form of a generally rectangular patch of adhesive on each flap 24. The central pad adhesive 74 provides an adhesive attachment means for securing the main body portion 22 of the sanitary napkin 20 in the crotch portion of a panty. The flap adhesives 76 are used to assist in maintaining the flaps 24 in position after they are wrapped around the edges of the crotch portion of the panty. The flaps can be maintained in position by attaching the flaps 24 to the undergarment, or to the opposing flap.

FIGS. 1 - 4 and 6 - 7 show one preferred version of the wrapper 78 of the present invention. As shown in FIG. 1, the wrapper, generally designated by reference number 78 comprises several elements. These elements can comprise integral portions of a single member or article, or they can comprise separate components joined to a member or article. The elements comprising the wrapper 78 include: a main wrapper sheet 80; an optional release component, such as a release paper (or release coating) 82 disposed on one side of the main wrapper sheet 80; a flap fastener cover, such as a flap adhesive cover 81.

The main wrapper sheet 80 (or "wrapper sheet") is the portion of the wrapper 78 which will be folded around the sanitary napkin 20 to provide an individual package for the sanitary napkin 20. The main wrapper sheet 80 preferably covers and is releasably attached to the central pad adhesive 74. The main wrapper sheet 80 preferably has dimensions that are slightly larger than those of the main body portion 22 of the sanitary napkin 20. Preferably, as shown in FIGS. 1, 2 and 7, the main wrapper sheet 80 has longitudinal side portions 80D which extend beyond the longitudinal side edges 26 of the main body portion 22 of the sanitary napkin 20. The main wrapper sheet 80 preferably also has a first end portion 80A and a second end portion 80B which extend beyond the end edges 28 of the main body portion 22 of the sanitary napkin 20. It is recognized, however, that satisfactory protection of sanitary napkin 20 may be afforded by a wrapper which is not larger than the main body portion 22 of the sanitary napkin 20.

The main wrapper sheet 80 can be made from any suitable material. The main wrapper sheet 80 is preferably manufactured from a thin flexible material which is liquid impermeable so that the wrapper 78 will be suitable for wrapping and disposing of a used sanitary napkin 20. For example, polyethylene films have been found to work well.

The main wrapper sheet 80 can be provided with the optional release component, such as release paper (or release coating) 82 so that the main wrapper sheet 80 will release from the central pad adhesive 74 when the wearer removes the sanitary napkin 20 from the wrapper 78. If a separate release paper is used, it can comprise any suitable material

known in the art for this purpose, such as coated papers. Suitable release papers are described in U.S. Patent 4,917,697. Such a release paper 82 can be laminated to the inside surface of the main wrapper sheet 80 as shown in FIGS. 3 and 6. If a release coating is used, the coating can be applied directly to the inside surface of the main 5 wrapper sheet 80. Such a coating can comprise any material known in the art for this purpose, with silicone coatings being preferred. If a coating is used, the coating 82 may be provided by coating only that zone of the main wrapper sheet 80 which will substantially contact the central pad adhesive 74. Alternatively, the entire inside surface of the main wrapper sheet 80 may be coated. Coating the entire inside of a wrapper is 10 disclosed in U.S. Patent 5,181,610 entitled "Flexible Container with Nonstick Interior" which issued to Quick et al. on January 26, 1993.

The flap adhesive cover (or "flap release strip") 81 covers and protects the flap adhesives 76, and maintains the flaps 24 in position folded over the topsheet 38 for packaging. In the preferred embodiment shown in FIGS. 1, 2 and 6, the flap adhesive cover 81 positions in the third region 43 and adjacent to the second end portion 80B of the main wrapper sheet 80 in a folded configuration. The flap adhesive cover 81 is folded to interpose the second end portion 80B and the end edge 28 of the sanitary napkin 20. The flap adhesive cover 81 is preferably joined to the main wrapper sheet 80.

As shown in FIG. 4, the flap adhesive cover 81 preferably may extend in the first 20 region 39 in a stretched configuration before the flap adhesive cover 81 is folded and joined to the main wrapper sheet 80. The flap adhesive cover 81 preferably comprises a single sheet having a first end portion 81C, a second end portion 81D and a pair of longitudinal side portions 81E. The flap adhesive cover 81 also comprises a transverse fold axis F3, a first portion 84 and a second portion 85. The transverse fold axis F3 25 divides the flap adhesive cover 81 into the first portion 84 and the second portion 85. The first portion 84 extends from the transverse fold axis F3 toward the fold axis F2 generally in the first region 39 and the second portion 85 extends from the transverse fold axis F3 toward the first end portion 80A of the main wrapper 80 generally in the second region 41. The first portion 84 covers and protects the flap adhesives 76 and the second portion 30 85 is joined to the main wrapper sheet 80.

The flap adhesive cover 81 also has two faces, one of which is a non-stick face (or releasable face) 81A, which is capable of releasable attachment with the flap fasteners, and an opposite face or side 81B. Preferably, as shown in FIG. 4, the non-stick face 81A of the flap adhesive cover 81 faces the flap adhesives 76 in a stretched configuration so 35 that it will be able to releasably adhere to the flap adhesive 76. When the flap fasteners 76 comprise adhesive fasteners, the non-stick face 81A can be provided by attaching a

separate release paper or element to the flap adhesive cover 81 which is treated with a non-stick material, or by treating all or a portion of the flap adhesive cover 81 with a non-stick coating, such as by silicone coating a portion of the flap adhesive cover 81. Alternatively, if the flap fasteners 76 comprise mechanical fasteners, such as VELCRO® 5 fasteners, the non-stick face may be provided by a nonwoven material capable of releasably engaging the mechanical fastening material. The opposing side 81B faces away from the flap adhesives 76. The opposing side 81B of the flap adhesive cover 81 need not have, and preferably does not have, a release coating thereon.

The flap adhesive cover 81, as shown in FIGS. 6 and 7, is joined to the main 10 wrapper sheet 80 in a folded configuration. The flap adhesive cover 81 is folded about the transverse fold axis F3 so that the main wrapper sheet 80 in the third region 43 is interposed between the first portion 84 and the second portion 85 of the flap adhesive cover 81. Alternatively, the flap adhesive cover 81 may be folded about the transverse fold axis F1. In such a case, the fold transverse axis F3 may coincide with the fold axis 15 F1. In the folded configuration, the opposing side 81B faces inside and the non-stick face 81A faces outside. As shown in FIG. 6, the opposing side 81B of the second portion 85 is joined to the outer surface of the main wrapper sheet 80 in the third region 43 adjacent to the second end portion 80B of the main wrapper sheet 80 by applying adhesive layer 83.

The flap adhesive cover 81 can be of any suitable size and shape, though the 20 figures depict a flap adhesive cover 81 which is only of sufficient width and length to cover and protect the flap adhesives 76.

The wrapper 78 preferably also comprises an optional package fastener 86 for retaining the package formed by folding the wrapper and sanitary napkin in its folded configuration. The package fastener 86 may be joined to the first end portion 80A of the 25 main wrapper sheet. The package fastener 86 is preferably both releasably attachable to the package and resealable. The package fastener 86 may be comprised of any releasably attachable and resealable fastener known in the art, such as spots or patches of adhesive, tapes, and mechanical fasteners. A tape tab with a pressure sensitive adhesive located thereon has been found to work well. The package fastener 86 can be disposed at any 30 suitable location on the wrapper 78. In the embodiment shown in FIGS. 1 and 2, the package fastener 86 is preferably positioned at opposing first end portion 80A of the main wrapper sheet 80.

For the initial packaging of the sanitary napkin 20 in the wrapper 78, the garment-facing side 20B of the main body portion 22 is placed on top of the main wrapper sheet 35 80. The sanitary napkin 20 is positioned so that the central pad fastener 74 lies over the release paper or release coating 82 on the main wrapper sheet 80. The flaps 24 are then

preferably folded over the topsheet 38 so that the flaps 24 are in the configuration shown in FIGS. 2 and 3. Folding the flaps 24 in the configuration shown in FIGS. 2 and 3 exposes the patches of adhesive 76 disposed on the garment-facing side of flaps 24 and causes the flaps 24 to cover at least a portion of the topsheet 38. Folding the flaps 24 over the topsheet 38 can, thus, be considered to provide a degree of protection to prevent the topsheet 38 from becoming soiled prior to use. In alternative embodiments, where one or both of the flaps 24 has a greater span (that is, its dimension measured in the transverse direction), the flaps 24 can be folded over the topsheet 38 so that one of the flaps 24 at least partially overlays the other flap 24 as shown in FIG. 5. The flap 24B overlays, attaches to, and protects the flap attachment means 76 of the flap 24A. The flap adhesive cover 84 will then overlay, attach to and protect the flap fastener 76 of the flap 24B.

After folding the flaps 24 over the topsheet 38, the sanitary napkin 20 and main wrapper sheet 80 will then preferably be folded into three regions that are defined by the fold axes F1 and F2 shown in FIG. 2. The fold axes F1 and F2 will divide both the sanitary napkin 20 and the main wrapper sheet 80 into three regions comprising the first region 39, the second region 41 and the third region 43. As shown in FIG. 2, the central region (the first region) 39 lies between preferred fold axes F1 and F2. The second and third regions 41 and 43 lie longitudinally outboard of the fold axes F1 and F2. As described above, the main body portion 22 is also separated at the fold axes F1 and F2 into three sections comprising the first section 36, the second section 34, and the third section 32. Each section 36, 34 and 32 generally extends in each region 39, 41 and 43 respectively.

FIG. 8 depicts the package for the sanitary napkin formed by folding the wrapper 78 and sanitary napkin 20 in one preferred configuration for shipment, sale, and convenient carrying by the wearer. After the flaps 24 are folded over the topsheet 38 as stated hereinabove, the first portion 84 of the flap adhesive cover 81 is placed over the sanitary napkin 20 in the third region 43 so that the non-stick face 81A of the flap adhesive cover 81 faces outside (refer to FIG. 2). As shown in FIG. 8, the third region 43 (i.e., the second end portion 80B of the main wrapper 80, along with the third section 32 of the main body portion 22, and the folded flap fastener cover 81) is folded about the fold axis F2 onto the first region 39 (i.e., the central portion 80C of the main wrapper 80, the first section 36 of the main body portion 22, the flaps 24 and the flap adhesives 76). When it is folded in this manner, the non-stick face 81A of the first portion 84 of the flap adhesive cover 81 is placed over the flap fasteners 76 and is releasably attached to each adhesive patch 76. In addition, the flap adhesive cover 81 provides a connection between each flap 24 that spans the flaps 24, thereby keeping the flaps 24 in the desired position

until the flap adhesive cover 81 is removed. After that, the second region 41 (i.e., the first end portion 80A of the main wrapper 80, along with the second section 34 of the main body portion 22) is folded about the fold axis F1 onto the third region 43. By pressing the tape tab 86 onto the exterior of wrapper 78 in the position depicted in FIG. 8, the sanitary napkin 20, its flaps 24 and wrapper 78 remain in the configuration shown.

Preferably, to complete the individual packaging of the sanitary napkin 20 in the wrapper 78 of the present invention, each longitudinal side edge 80D of the main wrapper sheet 80 is then frangibly sealed after the sanitary napkin 20 and the wrapper 78 are in the folded configuration shown in FIG. 8. The frangible sealing of the side edges 80D of the main wrapper sheet 80 can be accomplished by any suitable sealing technique. By way of example only, the longitudinal side edges 80D may be heat sealed, glued, or ultrasonically bonded as shown in FIG. 9. The entire sanitary napkin 20 is thereby protected until the wrapper 78 is opened. Suitable methods for frangibly sealing the longitudinal side edges are described in U.S. Patent 4,556,146 issued to Swanson.

The various embodiments of the wrapper 78 described herein can be made in any suitable manner. The flap adhesive cover 81 may be made of the same material as the main wrapper sheet or any adhesive cover material known in the art. The flap adhesive cover 81, if separate elements, can be joined to the main wrapper sheet 80 at any time during the manufacture of the individually packaged sanitary napkin 20 of the present invention. Preferably, for ease of manufacture, the flap adhesive cover 81 will be joined to the main wrapper sheet 80 after the sanitary napkin 20 is already placed on the main wrapper sheet 80. This will eliminate the need to temporarily remove the flap adhesive cover 81 from the main wrapper sheet 80 to allow the sanitary napkin 20 to be placed on the main wrapper sheet 80. The release paper or release coating 82 on the main wrapper sheet 80, the non-stick surface 81A on the flap adhesive cover 81 is preferably applied before the flap adhesive cover 81 is joined to the main wrapper sheet 80.

More preferably, for ease of manufacture, the flap adhesive cover 81 may be placed onto the flaps 24 as shown in FIG. 10 before the flap adhesive cover 81 is joined to the main wrapper sheet 80. The non-stick surface 81A of the flap adhesive cover 81 covers the flap adhesives 76. In addition, the flap adhesive cover 81 covers and protects majority of the body contacting surface 20A from contamination while manufacturing the absorbent article. The opposing sides 81B of the second portion 85 which are not treated releasably may be provided with the adhesive layer 83 adjacent to the second end portion 81D either before or after the flap adhesive cover 81 is placed onto the flaps 24. Alternatively, the adhesive layer 83 may be provided with the region 83A of outer surface of the main wrapper sheet 80 in the third region 43. The third region 43 is folded onto the

first region 39 about the fold axis F1. After that, the second region 41 is folded onto the third region 43 which is already folded onto the first region 39. When the second region 41 is folded, the adhesive layer 83 applied to the flap adhesive cover 81 is undetectably joined to the region 83A in the second end portion 80B of the main wrapper sheet 80.

5. When the individual packaged sanitary napkin 20 is opened, the flap adhesive cover 81 is removed from the flaps 24 but it stays with the second end portion 80B of the main wrapper sheet 80.

The consumer will ordinarily carry the individually packaged sanitary napkin of the present invention in the form depicted in FIGS. 8 and 9. As shown in FIG. 11, the 10 individually packaged sanitary napkin of the present invention may be opened by peeling the tape tab 86 from the wrapper 78 and breaking the frangible seals along the longitudinal side edges 80D of the main wrapper sheet 80. This gives the consumer access to the end edge 28 of the main body portion 22 of the second region 41. The consumer may then take hold of the end edge 28 of the main body portion 22 of the 15 second region 41 and pull the tape tab 86 from the sanitary napkin 20 as shown in FIG. 11. As the sanitary napkin 20 is separated from the wrapper 78, the central pad adhesive 74 is separated from the release paper 82. When the first section 36 and the second section 34 of the main body portion 22 separate from the wrapper 78, the first portion 84 of the flap adhesive cover 81 begins to separate from the flap adhesives 76 provided on the flaps 24 as shown in FIG. 12. The sanitary napkin 20 is further pulled from the 20 wrapper 78, the sanitary napkin 20 and the wrapper 78 are separated from one another. The separation of the sanitary napkin 20 from the wrapper 78 is preferably achieved in a single motion.

Once the sanitary napkin is removed from the wrapper 78 and installed in the 25 wearer's panties, the consumer may fold the wrapper 78, secure the wrapper 78 in its folded orientation by reattaching resealable tape tab 86 to wrapper 78. The consumer may then store the folded wrapper 78 for rewapping and disposing of the used sanitary napkin. The wearer need not worry about collecting and disposing of loose flap adhesive release strips, that were previously required, since all release strips are attached to or 30 integral with the wrapper 78. The present invention, therefore, provides the wearer with a clean sanitary napkin 20 which is easily installed and without extra pieces of waste which must be collected.

FIGS. 13 to 16 show another preferred embodiment of the present invention. The 35 sanitary napkin 20 shown in FIG. 13 generally has the same structure as the sanitary napkin shown in FIGS. 1 and 2. The wrapper 178 comprises several elements. The elements comprising the wrapper 178 include: a main wrapper sheet 180; a release paper

(main fastener cover) 182 disposed on one side of the main wrapper sheet 180; a flap adhesive cover 181. The flap adhesive cover 181 generally has the same structure as the flap adhesive cover shown in FIG. 1 and 2.

As shown in FIG. 13, the end edge 28 of the sanitary napkin 20 extends beyond 5 the second end portion 180B of the main wrapper sheet 180 in the third region 43. The release paper 182 comprises a pair of longitudinal side portions 182A, a pair of end portions 182B and 182C, an inner surface 182D and an outer surface 182E. The inner surface 182D covers the central pad adhesive 74 of the main body portion 22. At least a part of the outer surface 182E is connected to the inner surface of the main wrapper sheet 10 180. The end portion 182B of the release paper 182 in the third region 43 also extends beyond the second end portion 180 B of the main wrapper sheet 180. The outer surface 182E of the end portion 182B is exposed outside. The flap adhesive cover 181 is joined to the outer surface 182E of the end portion 182B in a folded configuration by adhesive layer 183. FIG. 16 depicts the package for the sanitary napkin formed by folding the 15 wrapper 178 and sanitary napkin 20 in one preferred configuration for shipment, sale, and convenient carrying by the wearer.

The disclosures of all patents, patent applications (and any patents which issue 20 thereon, as well as any corresponding published foreign patent application), and publications mentioned throughout this description are hereby incorporated by reference herein. It is expressly not admitted, however, that any of the documents incorporated by reference herein teach or disclose the present invention.

It is to be recognized that the foregoing detailed description of the preferred 25 embodiment of the present invention is given merely by way of illustration, and that numerous modifications and variations may become apparent to those skilled in the art without departing from the spirit and scope of the invention. Therefore, the scope of the present invention is to be determined by reference to the appended claims.

What is claimed is:

1. An individually packaged absorbent article comprising:
 - (a) an absorbent article extending in a longitudinal direction and comprising a main body portion having a pair of longitudinal side edges, a pair of end edges, a garment surface, and a body surface, wherein the garment surface of the main body portion may be placed in a wearer's undergarment, and the absorbent article comprises a pair of flaps joined to the main body portion and extending laterally outward beyond the longitudinal side edges of the main body portion, wherein the garment surface of each of the flaps comprises a flap fastener, and the flaps are folded over the body surface of the main body portion to expose the flap fastener,
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 - (b) a wrapper for the absorbent article, the wrapper comprising a main wrapper sheet and a flap fastener cover, wherein
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 - (c) the main wrapper sheet comprises a pair of longitudinal side portions, a pair of end portions, an inner surface facing the main body portion and an outer surface, the main wrapper sheet is positioned adjacent to the garment surface of the main body portion, wherein the main wrapper sheet and the main body portion of the absorbent article comprise two transverse axes and three regions divided by the two axes, wherein the three regions comprise a first region into which a majority of the flaps extends, a second region and a third region which position on both longitudinal sides of the first region, and the two transverse axes comprise the first axis extending laterally between the first region and the second region and the second axis extending laterally between the first region and the third region,
15
 - (d) the flap fastener cover comprises a pair of longitudinal side portions, a pair of end portions, a releasable surface facing the flap fastener of the flaps, an opposing surface, a first portion, and a second portion, wherein a majority of the first portion extends in the first region, and the flap fastener cover is releasably affixed to the flap fasteners of the flaps, wherein
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 - (e) the main wrapper sheet and the main body portion of the absorbent article are folded as a unit about the second axis so that the majority of the flaps superposes with the body surface side of the main body portion in the third region with interposing the first portion of the flap fastener cover therebetween, and the main wrapper sheet and the main body
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- 20
- 25
- 30

portion of the absorbent article are folded as a unit about the first axis so that the body surface side of the main body portion in the second region superposes with the outer surface side of the main wrapper sheet with interposing the second portion of the flap fastener cover therebetween, and

5 (f) at least a part of the second portion of the flap fastener cover is joined to the outer surface of the main wrapper sheet.

2. The absorbent article of Claim 1 wherein the flap fastener cover comprises a single separate element joined to the main wrapper sheet.

3. The absorbent article of Claim 1 wherein the wrapper further comprises a main fastener cover, wherein the main fastener cover comprises a pair of longitudinal side portions, a pair of end portions, an inner surface and an outer surface, wherein the inner surface covers the main fastener of the main body portion and at least a 5 part of the outer surface is connected to the inner surface of the main wrapper sheet.

4. The absorbent article of Claim 1 wherein the longitudinal side portions of the main wrapper sheet extend beyond the longitudinal side edges of the main body portion, and at least one of the end portions of the main wrapper sheet extends beyond the end edge of the main body portion.

5. The absorbent article of Claim 4 wherein the end portion of the main wrapper sheet of the second region extends beyond the end edge of the main body portion of the second region, wherein the end portion of the main wrapper sheet of the second region is joined to the outer surface of the main wrapper sheet.

5 (6. The absorbent article of Claim 5 wherein the second portion of the flap fastener cover is joined to the outer surface of main the wrapper sheet of the third region at least at a point adjacent to the end portion of the main wrapper sheet of the second region.

7. The absorbent article of Claim 4 wherein the end portion of the main wrapper sheet of the third region extends beyond the end edge of the main body portion of the third region.

8. The absorbent article of Claim 8 wherein a part of the flap fastener cover is joined to the inner surface of the main wrapper sheet at the end portion of the main wrapper sheet of the third region.

9. An individually packaged absorbent article comprising:

- (a) an absorbent article extending in a longitudinal direction and comprising a main body portion having a pair of longitudinal side edges, a pair of end edges, a garment surface provided with a main fastener, and a body surface, wherein the garment surface of the main body portion may be placed in a wearer's undergarment, and the absorbent article comprises a pair of flaps joined to the main body portion and extending laterally outward beyond the longitudinal side edges of the main body portion, wherein the garment surface of each of the flaps comprises a flap fastener, and the flaps are folded over the body surface of the main body portion to expose the flap fastener,
- (b) a wrapper for the absorbent article, the wrapper comprising a main wrapper sheet, a main fastener cover and a flap fastener cover, wherein
- (c) the main wrapper sheet comprises a pair of longitudinal side portions, a pair of end portions, an inner surface and an outer surface,
- (d) the main fastener cover comprises a pair of longitudinal side portions, a pair of end portions, an inner surface and an outer surface, wherein the inner surface covers the main fastener of the main body portion and at least a part of the outer surface is connected to the inner surface of the main wrapper sheet, wherein the main wrapper sheet and the main body portion of the absorbent article comprise two transverse axes and three regions divided by the two axes, wherein the three regions comprise a first region into which a majority of the flaps extends, a second region and a third region which position on both longitudinal sides of the first region, and the two transverse axes comprise the first axis extending laterally between the first region and the second region and the second axis extending laterally between the first region and the third region,
- (e) the flap fastener cover comprises a pair of longitudinal side portions, a pair of end portions, a releasable surface facing the flap fastener of the flaps, an opposing surface, a first portion, and a second portion, wherein a majority of the first portion extends in the first region, and the flap fastener cover is releasably affixed to the flap fasteners of the flaps, wherein

- (f) the main wrapper sheet and the main body portion of the absorbent article are folded as a unit about the second axis so that the majority of the flaps superposes with the body surface side of the main body portion in the third region with interposing the first portion of the flap fastener cover therebetween, and the main wrapper sheet and the main body portion of the absorbent article are folded as a unit about the first axis so that the body surface side of the main body portion in the second region superposes with the garment surface side of the main body portion in the third region with interposing the second portion of the flap fastener cover therebetween, and
- 5 (g) at least a part of the second portion of the flap fastener cover is joined to the main fastener cover.

10. The absorbent article of Claim 9 wherein the end portion of the main fastener cover extends beyond the end portion of the main wrapper sheet toward the end edge of the main body portion of the third region, wherein a part of the second portion of the flap fastener cover is joined to the end portion of the main fastener cover.

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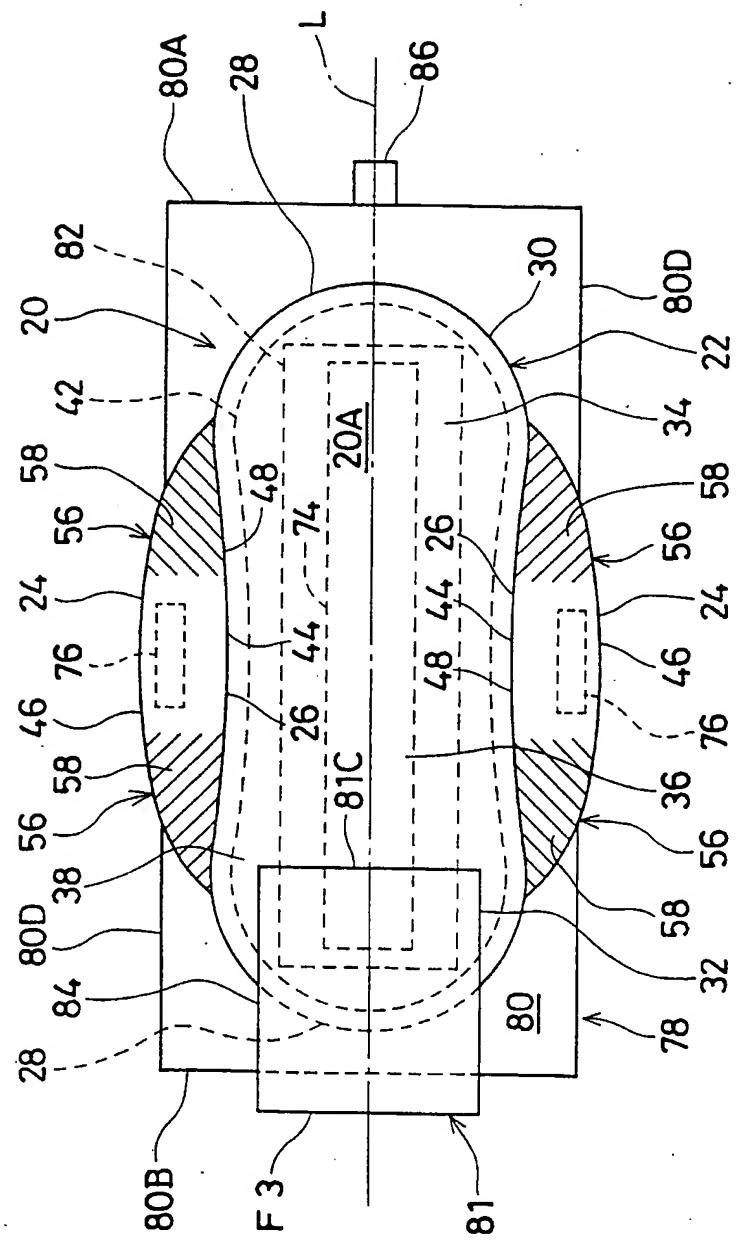


FIG. 1

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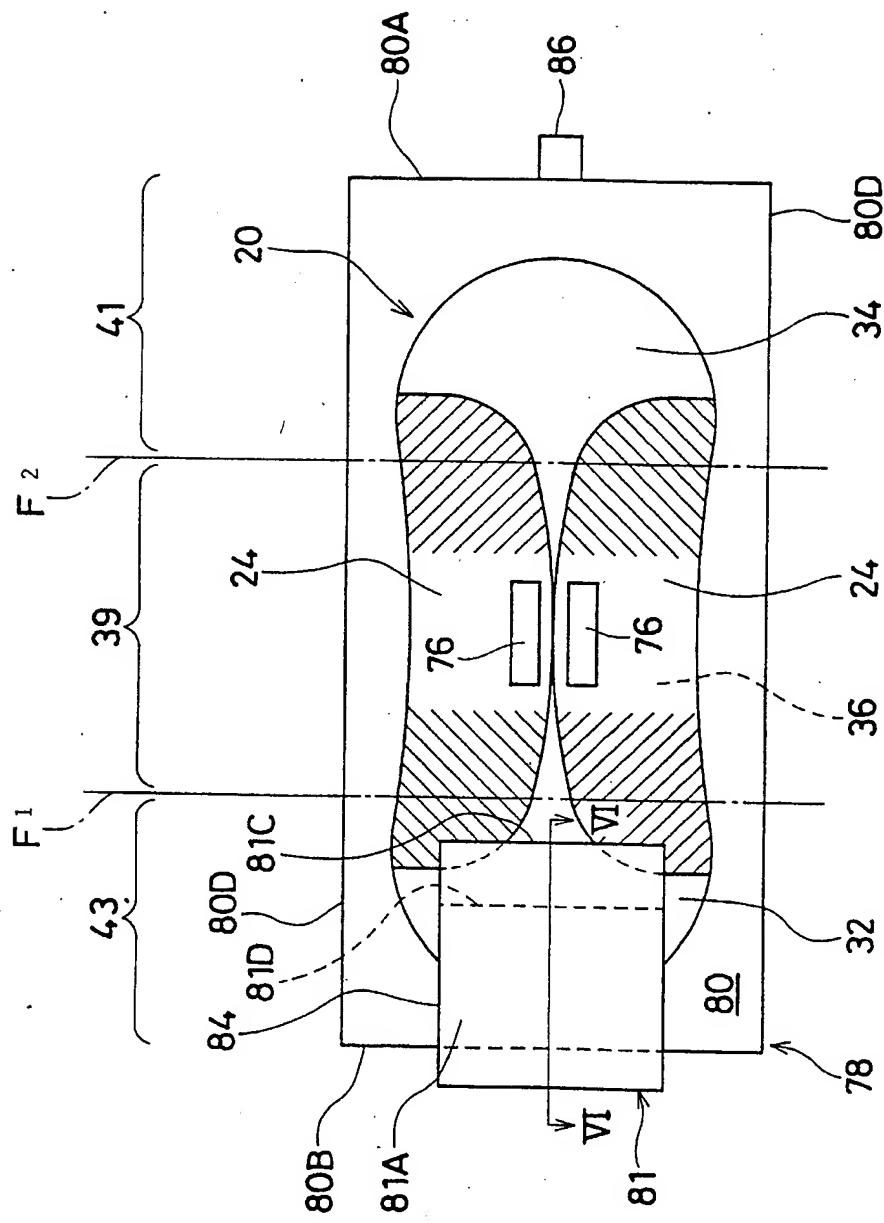


FIG. 2

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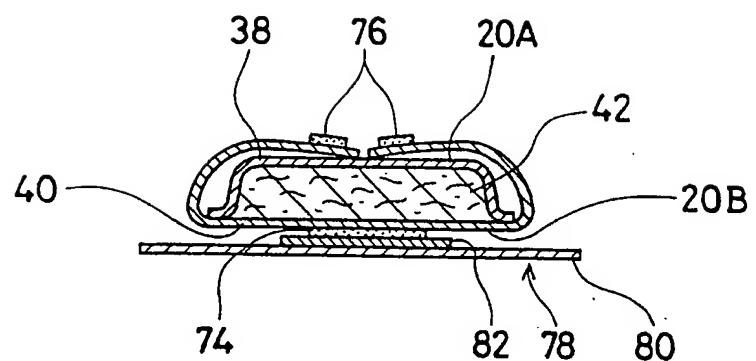


FIG. 3

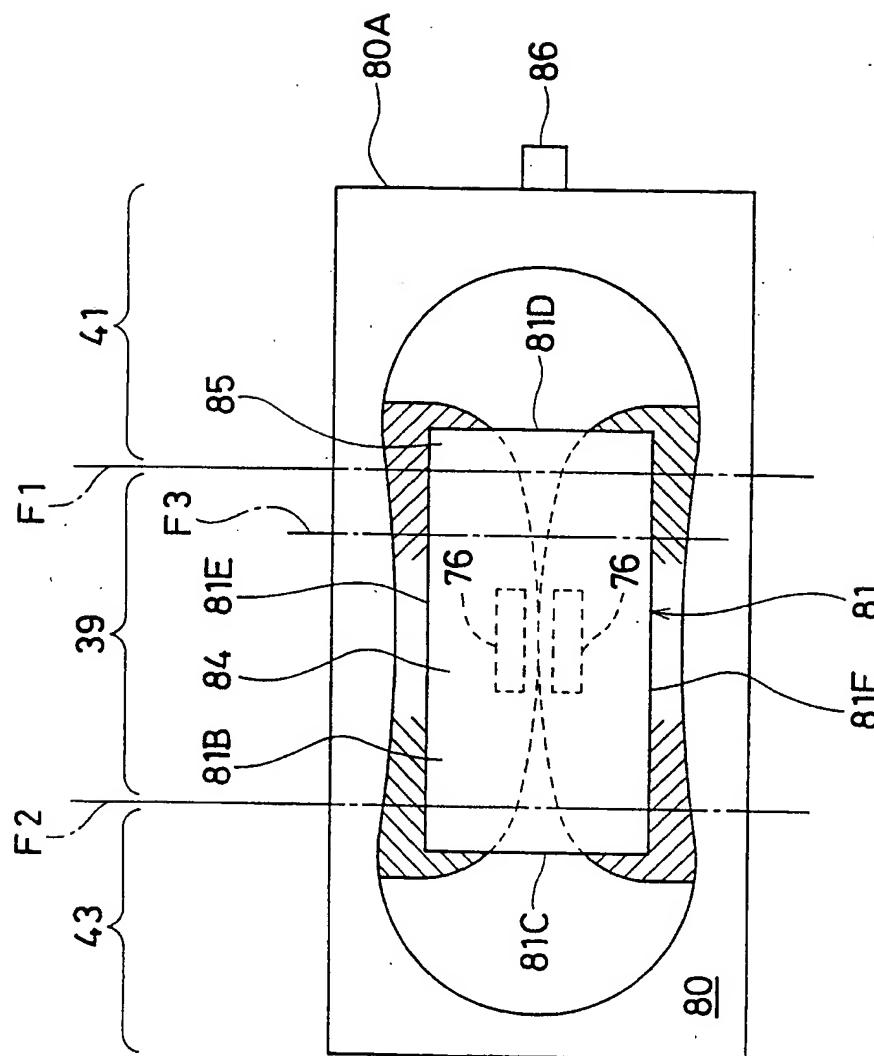


FIG. 4

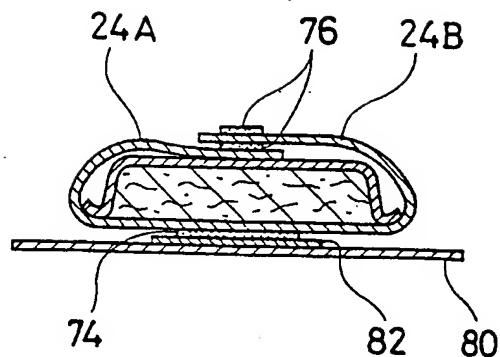


FIG. 5

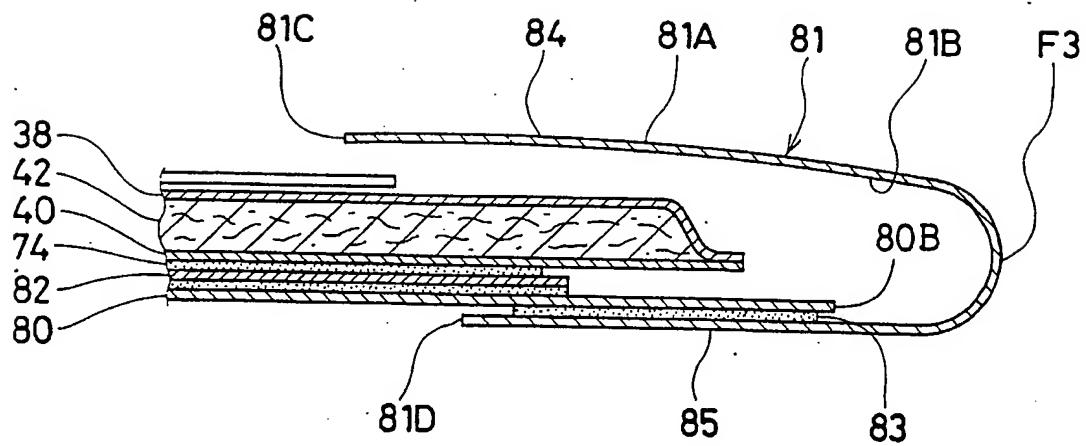


FIG. 6

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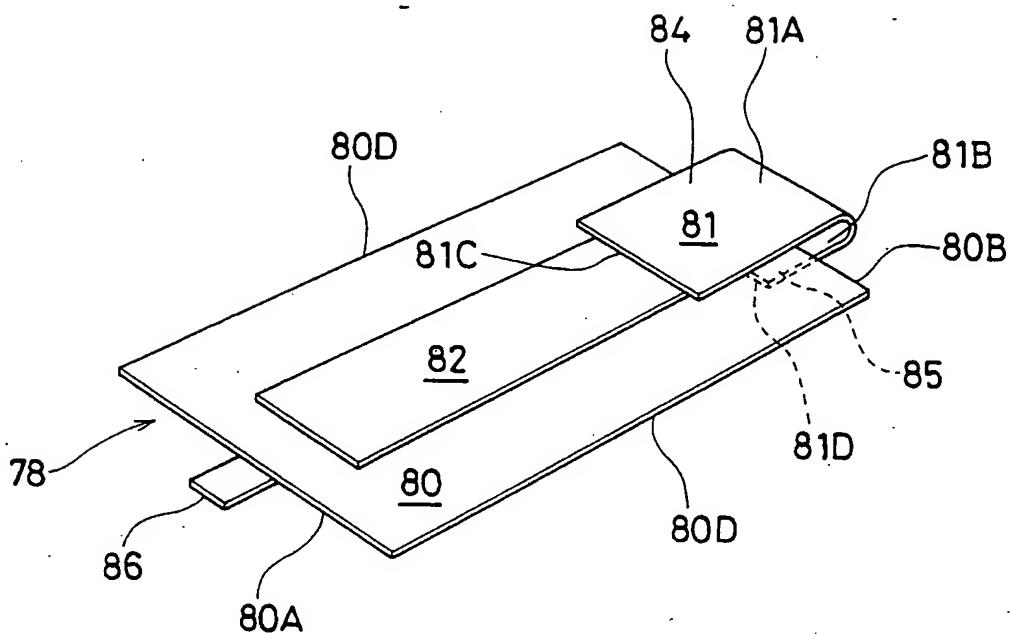


FIG. 7

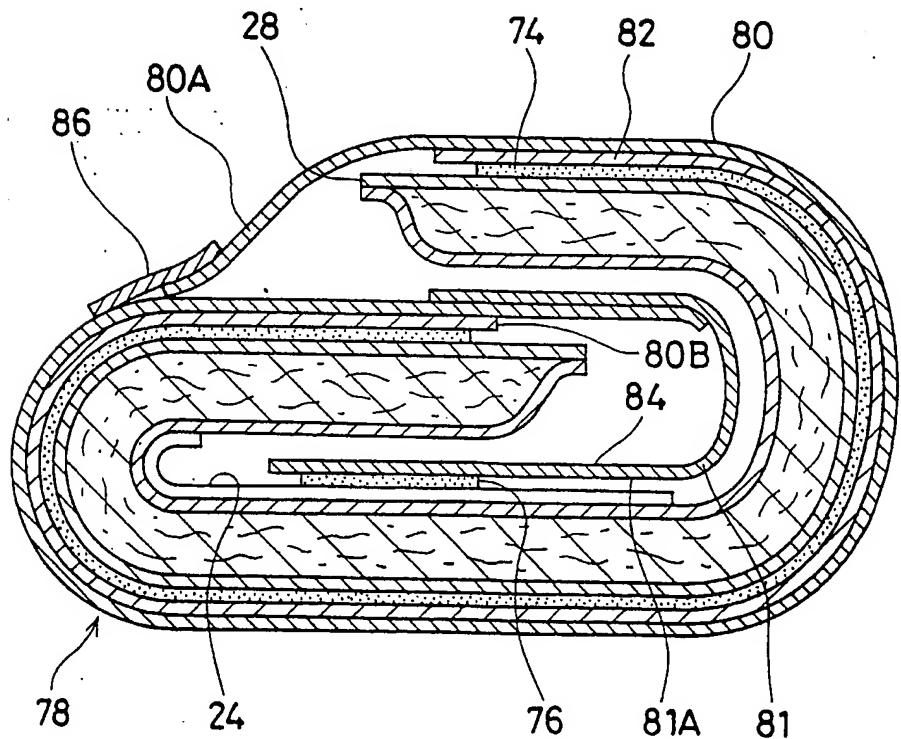


FIG. 8

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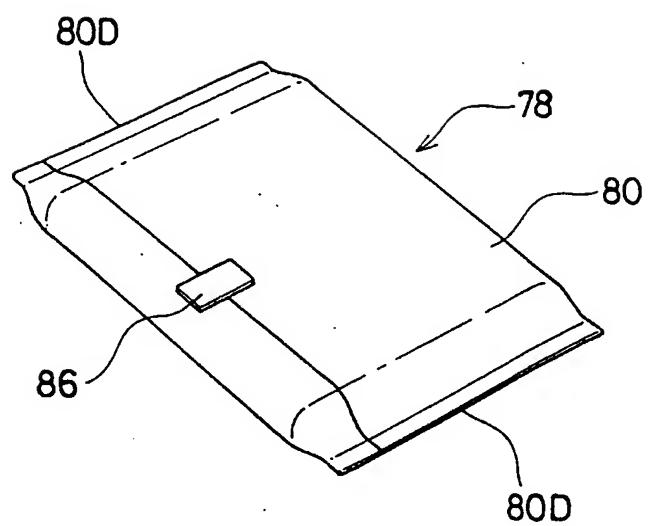


FIG. 9

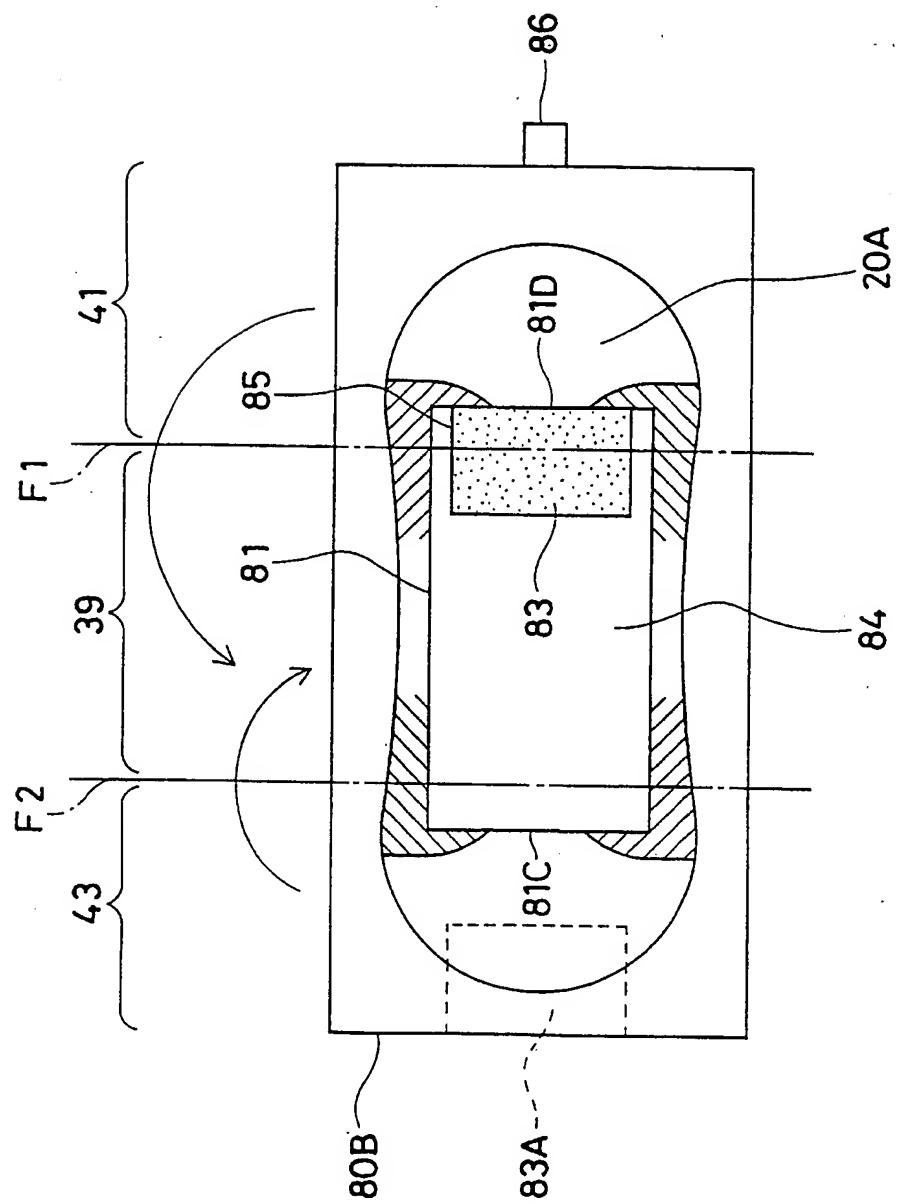


FIG. 10

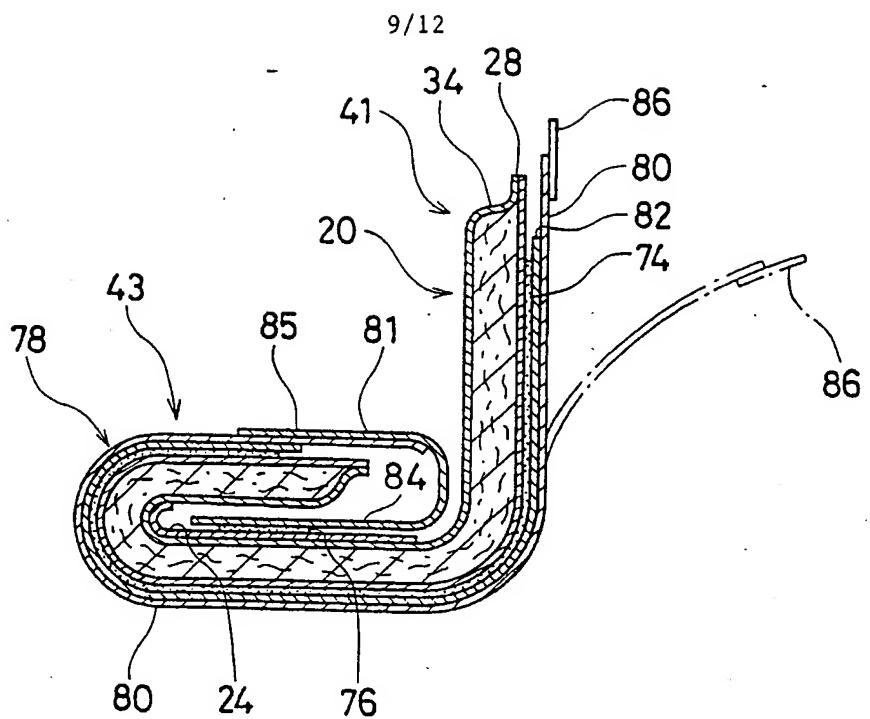


FIG. 11

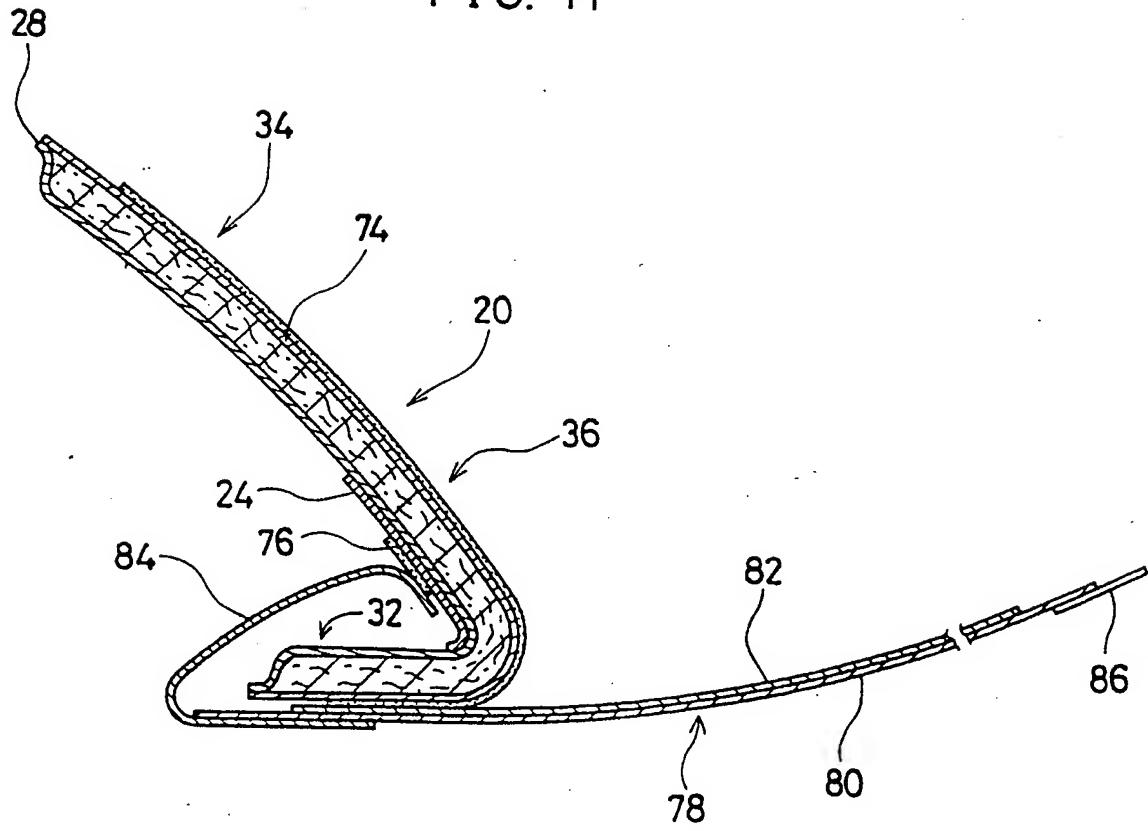


FIG. 12

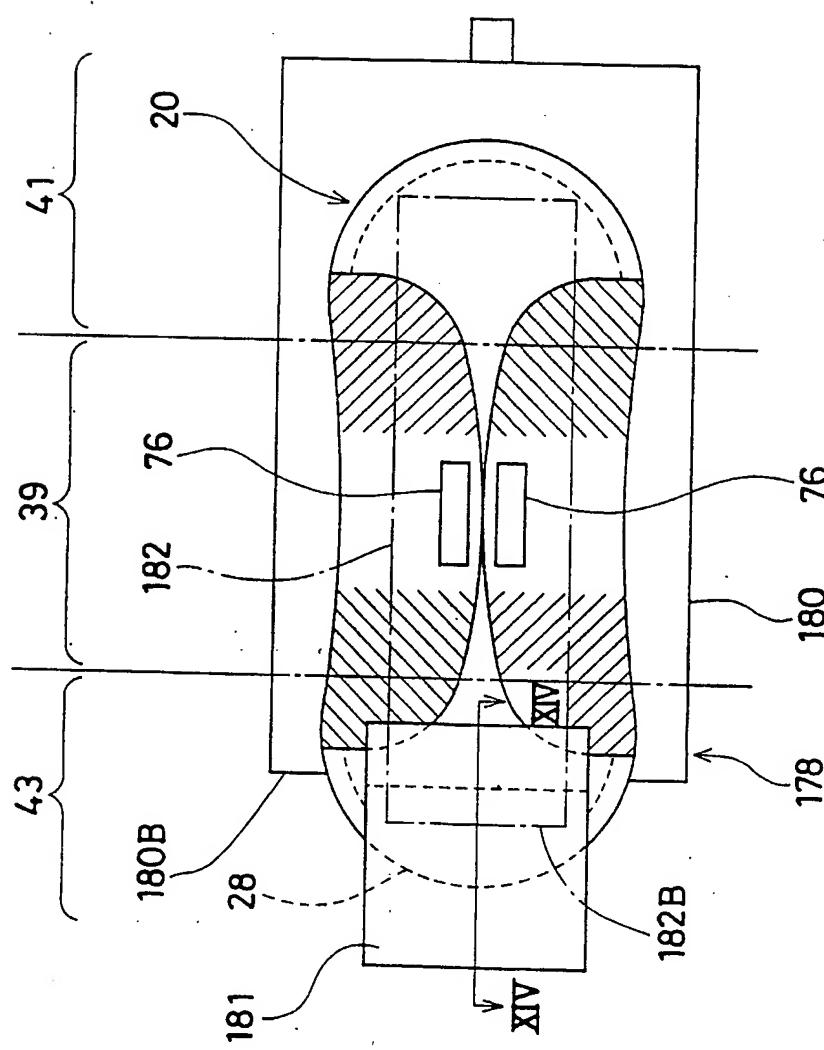


FIG. 13

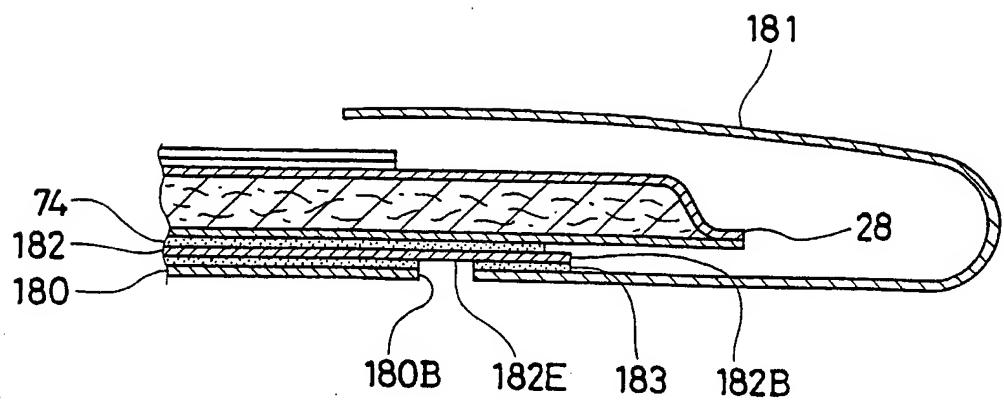


FIG. 14

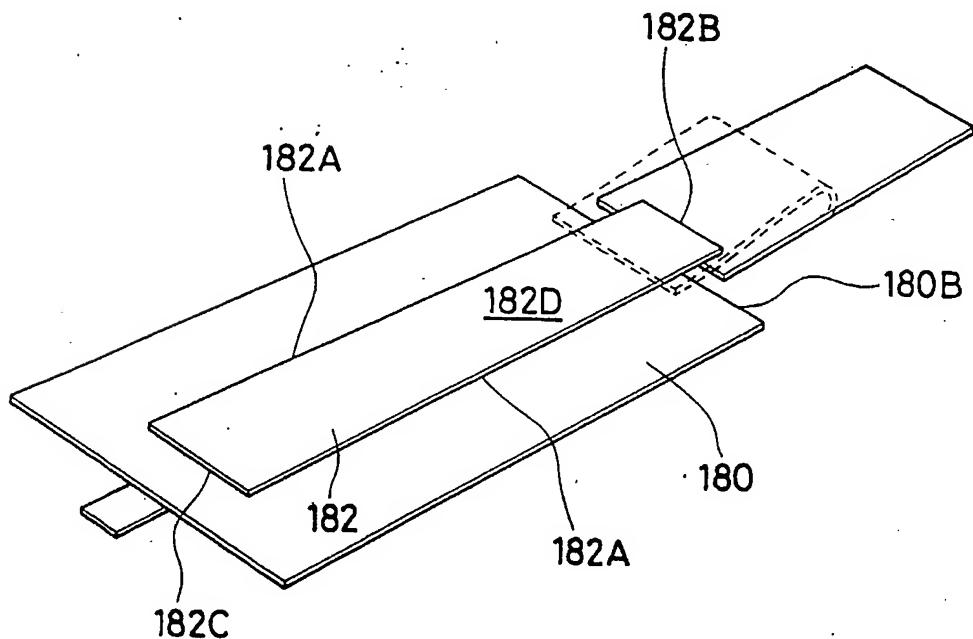


FIG. 15

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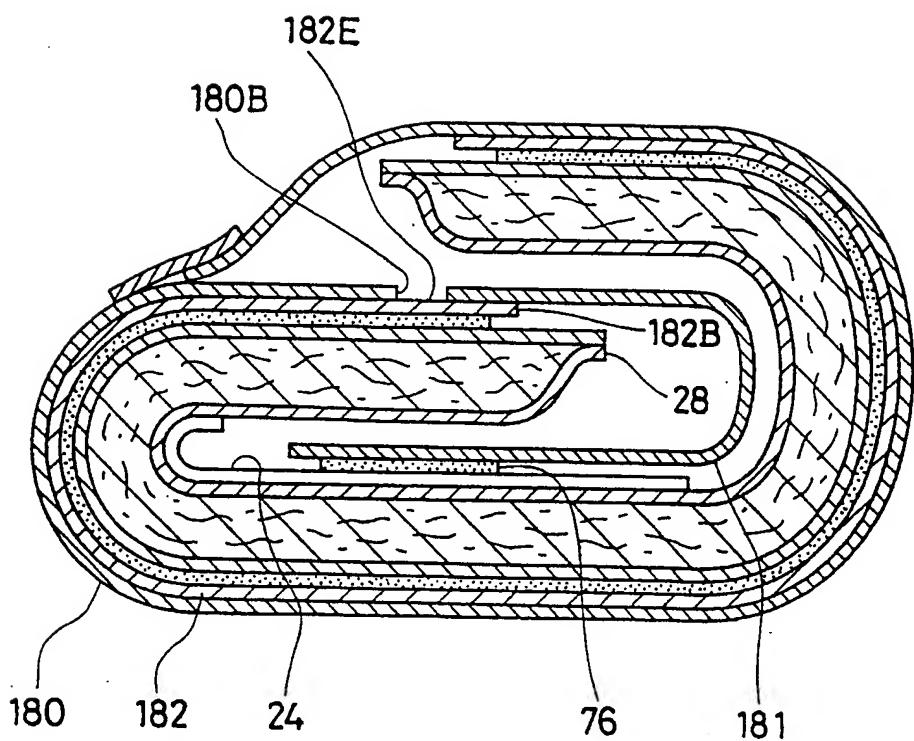


FIG. 16

INTERNATIONAL SEARCH REPORT

II. National Application No
PCT/US 97/09264

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A61F13/15

According to International Patent Classification(IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 750 896 A (UNI-CHARM) 2 January 1997 see the whole document	1-10
X	GB 2 306 428 A (SCA MÖLNLYCKE) 7 May 1997 see abstract; figures	1,2,4-8

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

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"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
"&" document member of the same patent family

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Date of the actual completion of the international search

10 February 1998

Date of mailing of the international search report

24/02/1998

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Hagberg, A

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 97/09264

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 750896 A	02-01-97	JP 9010257 A AU 5245896 A CA 2177671 A US 5683377 A	14-01-97 09-01-97 31-12-96 04-11-97
GB 2306428 A	07-05-97	SE 504796 C AU 7511296 A SE 9503818 A WO 9716143 A	28-04-97 22-05-97 28-04-97 09-05-97